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[54] **SHIELDING DEVICE FOR IMPROVING MEASUREMENT ACCURACY AND SPEED IN SCANNING ELECTRON MICROSCOPY**

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[52] **U.S. Cl.** **250/310**; 250/307

[58] **Field of Search** 250/310, 307

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[57] **ABSTRACT**

An electrically conductive, shielding mesh structure (**320**) is interposed between a scanning electron microscope (**10**) and a sample (**110**) being examined. This shield prevent electrical field (**325**) leakage from the microscope from reaching the sample (**110**) where it would otherwise interact with various sample compositions or structures unpredictably, causing uncertainty in the working and focal distances. The mesh (**320**) can be electrically biased and electrical field gradients can be introduced by applying different voltages to different wires (**360**, **510**) in the mesh. Alternatively, the mesh (**320**) can operate magnetically and adjustable magnetic and electric fields and fields gradients can be utilized to maximize collection efficiency and minimize distortion of scanned image. The absence of the perturbing leakage field (**325**) at the sample enables the use of an optical autofocus system (**630**,**640**, **690**, **700**, **730**, and **750**), resulting in a high sample throughput rate. The components which comprise the autofocus system are symmetrically arranged to prevent astigmatic distortion of the electron beam. These components can be electrically biased, thus enhancing efficiency of the microscope's x-ray and electron detectors (**170**, **240**, and **250**).

51 Claims, 4 Drawing Sheets